SECTION 02374

REVEGETATION
08/99

PART 1 GENERAL

1.1 SCOPE

The work covered in this section consist of furnishing all labor equipment, material, and supplies for [describe project].
The Contractor shall comply with all applicable Federal, State and local laws, regulations and permits.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF NURSERYMEN (AAN)

AAN-01	(1990) American Standard for Nursery Stock

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2607	(1969) Peats, Mosses, Humus, and Related Products
ASTM D 4972	pH of Soils
ASTM D 5268	Topsoil Used for Landscaping Purpose

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1909	(Basic; Notice 1) Fertilizer

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Erosion Control Material; [FIO][GA].

Manufacturer's literature discussing physical characteristics, application and installation instructions for erosion control material and representative samples of product materials.

SD-04 Drawings

As-Installed; [FIO][GA].

The Contractor shall maintain one set of records to show as-installed conditions. The drawings shall be on 22"x34" standard Corps of Engineer sheets. Hard copies and electronic files (if applicable) of the original site drawings will be provided upon request. These records shall be kept current and available to the Government when requested. All information which might be uncovered during the course of planting shall be accurately and neatly recorded as they occur by means of drawings, sketches, details, and notes. The record shall show, as a minimum, a complete list of all plants by species, size, location and date(s) planted. The location of the plantings shall be documented by marking-up a copy of the contract drawings. The exact location of each planting need not be determined with surveys, but shall be representative of their location in relation to their surroundings. Note the river flow at the nearest upstream gauge at the day of planting. These drawings shall be supplemented with maintenance and monitoring reports providing the rest of the required information.

Hard Copy Media: All As-Installed drawings shall be on 22' x 34" or 11" x 17" bond, vellum or mylar. All sheets shall contain the standard Army Corps of Engineers border. An electronic copy may be obtained from the contracting Officer.

Electronic CADD Format: All as-Installed drawings shall be saved in an Autocad Release 14 format for use on NT 4.0 Operating System. All files shall be submitted on 3-1/2" disk or readable CD. Specific instructions for labeling disk or CD-ROMs, directory structure, indexing and additional documentation requirements are listed on the internet. (Internet Address: http://www.cbbs.spk.usace.army.mil/html/ageguide.html)

SD-07 Schedules

Application of Pesticide Material; [FIO][GA].

A list of the proposed pesticide application equipment to be used in performance of the planting work, including descriptive data and calibration tests.

SD-08 Statements

Delivery; GA. Application of Pesticide Material; [FIO][GA].

The following work plans, before work is started.

A. Delivery Schedule at least 10 days prior to the intended date of the first delivery.

B. Pesticide Treatment Plan, giving proposed sequence of pesticide treatment work, before work is started. The pesticide trade name, chemical composition, formulation, concentration, application rate of active ingredients and methods of application for all materials furnished, and the name and state license number of the state certified applicator shall be included.

SD-09 Reports

Test and Soil Analysis; FIO][GA].

The Contractor shall provide certified reports of inspections and laboratory tests, prepared by an independent testing agency, including

analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

A. Percolation Test
B. Soil Test

Existing Vegetation; [FIO][GA].

The Contractor shall provide documentation and a report of general existing vegetative conditions for all project sites. The report shall serve as a vegetation baseline and shall include all information as specified in paragraph 3.1.4 Documentation of Existing Vegetation.

SD-13 Certificates

Topsoil; [FIO][GA]. Soil Amendments; [FIO][GA]. Plants; [FIO][GA]. Pesticide; [FIO][GA]. Antidesiccant;.[FIO][GA]. Mycorrhizal Fungi Inoculum; [FIO][GA].

Certificates of compliance certifying that materials meet the requirements specified, prior to the delivery of materials. Reports for the following materials shall be included.

A. Topsoil (if applicable): For pH, chemical analysis, mechanical analysis and particle size.

B. Fertilizer(if applicable): For chemical analysis and composition percent.

C. Plant Materials: For botanical and common name, size, quantity by species, grade, nursery grown.

D. Pesticide Material(if applicable): For EPA registration number and registered uses.

SD-18 Records

Daily Revegetation Establishment Record; [FIO][GA].

(Form A, available on request in electronic or hard copy format): Use this form to document work performed during the Installation Period.

1.4 INSPECTIONS

It is the Contractor's responsibility to notify the Contracting Officer at least 5 days prior to each anticipated inspection. The Contracting Officer may at anytime inspect work without notification. The following are key inspection events:

1.4.1 Plant Inspection at Nursery

Plant materials shall be subject to inspection at the growing site by the Contracting Officer and the Contractor.

1.4.1.1 Government Furnished Plants

If the Contracting Officer and Contractor collectively agree to reject Government provided nursery stock, the Nursery shall be required to find a

plant source to replace those rejected plants at no additional cost to the Contractor or Government.

1.4.1.2 Contractor Furnished Plants

If the Contracting Officer rejects reject provided nursery stock, the Contractor shall be required to find a plant source to replace those rejected plants at no expense to the Government.

1.4.2 Plant Inspection at Job Site

Plant material shall be inspected upon arrival at the job site (and prior to installation) by the Contracting Officer and Contractor for conformity to the paragraph PLANTS (see PARAGRAPH 2.1) and SHIPMENT (see paragraph 1.5.1. Any unacceptable plant material shall be removed from the job site.

1.4.3. Site Preparation and Plant Layout

Site preparation and plant Layout shall be inspected for conformance to paragraph 3.2 SITE PREPERATION. The Contracting Officer may require the Contractor to adjust planting locations to meet field conditions without any additional cost to the Government.

1.4.4 Plant Installation

Plant installation will be inspected by the Contracting Officer for conformance with the plans and specifications.

1.4.5 Irrigation System

Inspection of the irrigation system by the Contracting Officer is to verify the system is operable and capable of delivering the required amounts of water to each plant and shall be conducted prior to planting operations. It is the Contractor's responsibility to ensure the system is adequate to deliver the required amount, rate and frequency of water for the duration of the installation and establishment periods.

1.4.6. Installation Acceptance Inspections

Installation acceptance shall be initiated only after all requirements have been completed. No partial inspection shall be conducted.

1.4.6.1 Preliminary Inspection

Prior to the completion of the Installation Period, a preliminary inspection shall be held by the Contracting Officer. Time for the inspection shall be requested in writing by the Contractor at least 5 working days prior to desired date. The quantity and type of plants installed, clean up requirements (see Clean Up paragraph 3.7.2) and the acceptability of the plants installed, in accordance with the requirements stated herein, shall be determined and noted in writing.

1.4.6.2 Final Inspection

A final inspection shall be requested in writing by the Contractor at least 5 working days prior to the desired date. At the final inspection, the Contracting Officer will evaluate the deficiencies noted in the preliminary inspection, have been corrected. Time for the inspection shall be established in writing. An "Installation Acceptance" will be given after

all installation requirements have been satisfactorily completed and approved by the Contracting Officer. PARTIAL ACCEPTANCE OF ANY ITEM OR COMBINATION OF ITEMS WILL NOT BE GIVEN. A written acceptance by the Contracting Officer shall constitute the beginning of the Establishment Period.

1.5 SHIPMENT, DELIVERY, STORAGE, AND HANDLING

1.5.1 Shipment

Preparation for shipment shall be done in a manner that will not cause shock or damage to branches, trunk, or root systems.

1.5.1.1 Container-Grown Plants

Container shall be sufficiently rigid to hold ball shape and protect root mass during shipping. Plants shall be protected from the direct impacts of sun and wind during transport

1.5.1.2 Live Cuttings

Live cuttings shall be bound together securely at the collection site in bundles and arrive on the job site within 8 hours of harvesting.

1.5.1.3 Herbaceous Transplants (Plugs)

Plugs shall be placed in containers and covered with wet burlap at the collection site and shall arrive on the job site within 8 hours of harvesting.

1.5.1.4 Woody Transplants

Woody transplants shall have a rootball contained in such a manner as to retain the root mass, including the soil surrounding the rootball, as a continuous unit. Rootball containment may include burlap secured with wire or twine; wire root ball baskets, or close fitting wooden boxes. The root mass shall be kept firm during shipping, storage and all handling. The rootball shall be kept moist at all times during transport. The transplant shall arrive at the job site within 8 hours of harvesting.

1.5.1.5 Antidesiccant Application

During shipping plants shall be sprayed with an antidesiccant as leaf budding occurs or when plant material has soft growth.

1.5.2 Delivery

Plants shall be picked up by the Contractor from the nursery and/or collection source(s) and delivered to the installation site.

1.5.2.1 Plant Protection During Delivery

Plants shall be protected during delivery to prevent desiccation of the plant or damage to the roots or balls. Plants shall be delivered in a covered vehicle capable of providing protection from sun and wind damage. Branches of plants shall be protected by tying-in the branches and covering all exposed branches.

1.5.2.2 Topsoil

A soil test shall be provided for topsoil delivered to the site.

1.5.2.3 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.5.2.4 Pesticides and Herbicides

Pesticide and Herbicide materials shall be delivered to the site in the original unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration numbers and the registered uses.

1.5.2.5 Other

The Contractor shall be responsible for picking up and delivery of all required materials from the supplier and deliver it to the job site, unless otherwise specified.

1.5.3 Storage

1.5.3.1 Container- Grown Plants

Plants not installed on the day of arrival at the site shall be stored and protected in areas designated by the Contracting Officer. Plants shall be protected from exposure to wind and shall be shaded from the sun. Covering that will allow air to circulate and prevent internal heat from building up shall be provided. Plants shall be kept in a moist condition by watering with a fine mist spray until planted.

1.5.3.2 Live Cuttings

Plants not installed on the day of arrival at the site shall be stored and protected in areas designated by the Contracting Officer. Plants shall be protected from exposure to wind and shall be shaded from the sun. All material collected more than 12 hours prior to installation shall be carefully bound, secured and heeled into moist soil or stored submerged in water. When outdoor temperature exceeds 50 degrees Fahrenheit/10 degrees Centigrade live cuttings shall be installed the day they are cut. Indoor locations and storage containers used in live cutting storage shall maintain a temperature between 34 degrees and 50 degrees Fahrenheit/1 degree and 10 degrees Centigrade. No live cuttings shall be stored for a period of more than two weeks

1.5.3.3 Herbaceous Transplants (Plugs)

Plugs not installed on the day of arrival at the site shall be stored and protected in areas designated by the Contracting Officer. Plants shall be protected from exposure to wind and shall be shaded from the sun. Covering that will allow air to circulate and prevent internal heat from building up shall be provided. Plants shall be kept in a moist condition by watering with a fine mist spray until planted.

1.5.3.4 Woody Transplants

Plants not installed on the day of arrival at the site shall be stored and protected in areas designated by the Contracting Officer. Plants shall be protected from exposure to wind and shall be shaded from the sun. Covering that will allow air to circulate and prevent internal heat from building up shall be provided. Plants shall be kept in a moist condition by watering with a fine mist spray until planted.

1.5.3.5 Other Materials

Soil amendments shall be stored in dry locations away from contaminants. Pesticide materials shall not be stored with other landscape materials. Storage of materials shall be in areas designated or as approved by the Contracting Officer.

1.5.4 Handling

Care shall be taken to avoid injury to plants. Materials shall not be dropped from vehicles. Balled and burlapped plants shall be handled carefully to avoid cracking or breaking the earth ball and container-grown plants shall be handled by the container. Plants shall not be handled by the trunk or stems.

1.6 WARRANTY

Plants shall be guaranteed to be in a vigorous growing condition with 100% survival at the time of Installation Acceptance

1.7 INSTALLATION PERIOD

The installation period begins, when the Notice to Proceed (NTP) is given and continues until all requirements indicated in this specification and accompanying drawings are completed and approved and a written acceptance is given by the Contracting Officer.

1.8 TIMES AND CONDITIONS

Planting and construction operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture, winds or other unsatisfactory conditions prevail, the work shall be stopped when directed by the Contracting Officer. The Contractor shall schedule planting in the mornings to avoid stressing plants during installation, if the planting schedule calls for installation when the temperature is expected to be 90 degrees Fahrenheit/32 degrees Centigrade or greater. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted in writing to and approved by the Contracting Officer. The Contractor shall be prepared to install plants at the earliest time when all conditions (weather, moisture, temperature, tides and river flows, etc...) are acceptable.

1.8.1 Start Dates

All plants shall be installed at the earliest available time during the following start dates and be completed by 15 March [____]. If appropriate conditions allow, the Contractor may request earlier start dates. No variance to the start dates will be allowed unless given in writing by the Contracting Officer. Start dates shall be as indicated below:

1.8.1.1 Irrigation System

[Day] [Month] [Year]

1.8.1.2 Container Plant Installation

[Day] [Month] [Year]

1.8.1.3 Live Cutting Installation

[Day] [Month] [Year]

1.8.1.4 Direct Seed Installation

[Day] [Month] [Year]

1.8.1.5 Herbaceous Transplant Installation

[Day] [Month] [Year]

1.8.1.6 Woody Transplant Installation

[Day] [Month] [Year]

1.8.1.7 Access Roads Installation

[Day] [Month] [Year]

1.8.1.8 Fencing Installation

[Day] [Month] [Year]

1.8.1.9 Sign Installation

[Day] [Month] [Year]

1.8.2 Planting Layout

Plant layout and installation shall proceed only when site conditions are conducive to layout and planting at the specified elevations. If water level conditions prohibit planting at the specified elevations the Contracting Officer will determine if the contractor shall proceed further or be deferred until conditions are conducive or be halted with no additional work being done.

1.9 MEASUREMENT AND PAYMENT

1.9.1 Container Plants

Container stock shall be measured by the number of individual plants in accordance with plans and specifications and as directed by the contracting officer. Payment for container stock shall be made at their respective unit price per individual plant, which will include but not be limited to [cost of plant material,]delivery of plant material, Layout of plant material, installation of plant material,and general maintenance until installation period acceptance. Measurement and payment of container plants shall include all materials and labor associated with plant protection, water basins, and mulch.

1.9.2 Live Cuttings

Live cuttings shall be measured by the number of cuttings in accordance with plans and specifications and as directed by the contracting officer. Payment for live cuttings shall be made at their respective unit price per individual cutting, which will include but not be limited to harvesting, delivery of cuttings, Layout of cuttings, installation of cuttings, and general maintenance until installation period acceptance. Measurement and payment of live cuttings shall include all materials and labor associated with plant protection, water basins, and mulch.

1.9.3 Direct seed

Direct seed shall be measured by the number of seeding units (a single seeding unit may include multiple seeds) in accordance with plans and specifications and as directed by the contracting officer. Payment for direct seeds shall be made at their respective unit price per individual seed unit, which shall include but not be limited to [cost of seed material,][harvesting of seed material,]delivery of direct seed material, Layout of seed material, installation of seed material, and general maintenance until installation period acceptance. Measurement and payment of direst seeds shall include all materials and labor associated with plant installation and protection, water basins, and mulch.

1.9.4 Herbaceous Transplants (Plugs)

Plugs shall be measured by the number of individual plants in accordance with plans and specifications and as directed by the contracting officer. Payment for Plugs shall be made at their respective unit price per individual plant, which will include but not be limited to [cost of plant material,]removal of plant material, delivery of plant material, Layout of plant material, installation of plant material, and general maintenance until installation period acceptance. Measurement and payment of Plugs shall include all materials and labor associated with plant installation and protection, water basins, and mulch.

1.9.5 Woody Transplants

Woody transplants shall be measured by the number of individual plants in accordance with plans and specifications and as directed by the contracting officer. Payment for Woody transplants shall be made at their respective unit price per individual plant, which will include but not be limited to removal of plant material, delivery of plant material, Layout of plant material, installation of plant material, and general maintenance until installation period acceptance. Measurement and payment of woody transplants shall include all materials and labor associated with plant installation and protection, water basins, and mulch.

1.9.6 Irrigation System

Irrigation system shall not be measured. Payment for irrigation system shall be at the lump sum price for "Irrigation System" in accordance with plans and specifications and as directed by the Contracting Officer. Payment shall be in full compensation for all design, layout, labor, materials and cost associated with meeting the PRODUCTS and EXECUTION watering requirements as specified in this section to include water source, delivery and operation of system.

1.9.7 Fencing

Fencing shall be measured by the linear [feet][meter] of fencing installed in accordance with plans and specifications and as directed by the Contracting Officer. Payment shall be made at the contract unit price per linear feet, and shall include layout, material, labor and cost associated with producing, constructing and installing fencing.

1.9.8 Signs

Signs shall be measured by the number of individual signs constructed and installed in accordance with plans and specifications and as directed by the Contracting Officer. Payment shall be made at the contract unit price per individual sign and shall include all material, labor and cost associated with producing, constructing and installing signs.

1.9.9 Beaver Barrier Cages

Beaver barrier cages shall be measured by the number of individual beaver barrier cages constructed and installed in accordance with plans and specifications and as directed by the Contracting Officer. Payment shall be made at the contract unit price per individual beaver barrier cage and shall include all material, labor and cost associated with constructing and installing beaver barrier cages.

1.9.10 Access Roads

Access roads shall be measured by the linear [feet][meter] of access road constructed in accordance with plans and specifications and as directed by the Contracting Officer. Payment shall be made at the contract unit price per linear feet, and shall include layout, grading, materials, labor and cost associated with construction road access.

1.9.11 Site Preparation and Layout

Site preparation and Layout shall not be measured. Payment for site preparation and layout shall be at the lump sum price for "Site Preparation and Layout" in accordance with plans and specifications and as directed by the Contracting Officer. Payment shall be in full compensation for all layout, labor, materials and cost associated with soil preparation, herbicide application, mowing, discing (prior to plant layout); surveying, and infrastructure layout.

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Varieties

Plants other than pole cuttings shall be nursery grown or plantation grown stock conforming to the container material standards as indicated herein (see paragraph 2.1.3.4 Container plant Standards) and shall be of the varieties specified in the plant list bearing botanical names listed in one or more of the publications under "Nomenclature" in AAN-01.

2.1.2 Substitutions

If the species specified cannot be secured, the Contractor shall submit alternate species for the Contracting Officer's approval. Substitutions

will not be permitted without written request from the Contractor for approval by the Contracting Officer.

2.1.3 Collection and Propagation

Seed and cuttings shall be collected and propagated according to native nursery industry standard collection propagation and nursery techniques. Plants shall be nursery grown of healthy, vigorous stock free of insects and disease, and as specified herein.

2.1.3.1 Collection Procedures

Plant sources and collection sites shall be located in the vicinity of the project. Material that is unavailable in the vicinity of the project shall be collected within a [30]mile/[48] kilometer radius of the project location. Seed shall be collected from a number of representative material sources to ensure genetic diversity and viability of the material. Seeds and/or cuttings shall be collected in sufficient quantities to obtain survival of the required amounts at the time of delivery to the government. When obtaining cuttings, ensure that "over-cutting does not occur in an area. Cuttings shall be [1/2 in.-1 1/2 in.]/[13 mm-38 mm] in diameter or as otherwise specified and shall be taken from healthy stock material. Cuttings shall not be obtained from an area where permanent damage to the area or existing vegetation would occur. The Contractor shall obtain permission from landowners and obtain all necessary permits prior to collection of cuttings.

2.1.3.2 Growing Conditions

Plants shall be grown under climatic conditions similar to those in the locality of the project. Seeds and cuttings shall be germinated in flats and transferred to specified containers when of sufficient size. Propagation and transfers shall be timed to meet contract specifications of container sizes and delivery schedules. Any and all mortality sustained shall be the responsibility of the Contractor and replaced by the Contractor with no additional cost to the Government or contract delays. Plants shall also be hardened if necessary in time to meet delivery schedule requirements.

2.1.3.3 Container Size

All plants shall be grown in containers made of durable plastic construction and designed to create a deep root system, except for biodegradable containers as specified. Containers shall have interior vertical ribs which train roots downward and guard against swirling. The bottom of the containers shall have drainage holes for air-pruning. Plants shall be delivered in containers which they are grown as specified herein. Plant material shall be grown in acceptable native nursery industry containers. Container sizes referenced herein shall be as follows:

A. Plugs: Plugs shall have a capacity of 2 cu. in./33 cu. cm, and be 1.25 sq. in./8 sq. cm X 3 in./8 cm long.

B. Tree Bands: Tree Bands shall have a capacity of 20 cu. in./ 327 cu. cm, and be 2.25 sq. in./15 sq. cm X 5 in./13 cm long (depth).

C. Super Cells: Cells shall have anti-spiral ribs and a bottom drainage hole with 3 or 4 side drainage holes on the tapered end.

The cells shall be capable of being individually rearranged in containment trays. Super cells shall have a capacity of 10 cu. in. /164 cu. cm, with a 1.5 in./3.8 cm dia and 8.25 in./21 cm cell depth.

D. Deepots: Deepots shall be D40 size containers and have vertical ribs to train roots downward and a bottom drainage hole with 3 or 4 side drain holes on the tapered end. The cells shall be capable of being individually rearranged in containment trays. D40 Deepots shall have a capacity of 40 cu. in./656 cu. cm, with a 2.5 in.6.4 cm dia. an 10 in./25 cm cell depth.

E. Treepots: Treepots shall have vertical ribs to train roots downward, keeping the roots free of swirling and a bottom drainage hole. Treepot 4 shall have a capacity of 173 cu. in/2835 cu. cm, with a 4 in./10 cm width and 14 in./36 cm depth. Treepot 6 shall have a capacity of 380 cu. in/6228 cu. cm, with a 6 in./15 cm width and 16 in./41 cm depth. Treepot 8 shall have a capacity of 588 cu. in/9637 cu. cm, with a 7.75 in./20 cm width and 18 in./46 cm depth.

2.1.3.4 Container Plant Standards

The plants top growth shall be in proportion to its root development. The plant shall exhibit proper form for each species and meet all the stem caliper and branching standards as indicated herein. Plants that do not meet all the minimum requirements will be rejected by the government and shall be the responsibility of the contractor to secure acceptable material at no additional cost to the government.

A. Species Form and Top Growth: Tree species shall be grown with a single, non-headed leader. Shrubs shall be left in natural form and not sheared unless noted. The plants top growth shall be sufficiently large enough for the specified container it is grown in. The nursery shall time the germination and/or propagation of the seed or cutting so that it is at the proper size at the indicated delivery time. Undersized and oversized material may be rejected by the Contracting Officer. The plant shall have a main leader with normal caliper and development and growth so that it is not spindly and is able to support itself in an upright position. The plant shall be in healthy condition without signs of stress, disease, pest or mechanical damage. The following list is the acceptable container plant standard for contractor grown plants for top growth and container size and species indicated. Plant minimum top growth for all tree, shrub and herbaceous species shall be as follows: tree bands, 6 in./152 mm; super cells, 6 in./152 mm; deepots, 10 in./254 mm; treepots 4's, 12 in./ 304 mm; treepot 8's, 24 in./609 mm (except for willow, oak and alder species shall have a minimum top growth of 18 in./457 mm)

B. Root Development: The plants root system shall have a main root which is unkinked and free from swirling. Secondary roots shall be well developed and be capable of binding the root mass together and retain its shape when removed from its container.

C. Biodegradable Container Material: Plant material shall be propagated in containers constructed of pulp or equivalent biodegradable material, consisting of a soil mixture of clay loam and rock or equivalent mixture capable of producing healthy

growing conditions while providing resistance to movement and water erosion. Propagules may be transplanted to the appropriate container and soil mixture one time prior to installation.

2.1.4 Quality

Well shaped, well grown, vigorous, healthy plants having well branched root systems shall be provided. Plants shall be provided free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement and abrasion. Plants shall be provided that are typical of the species or variety and and as specified herein.

2.1.4.1 Container Plant Standards

The plants top growth shall be in proportion to its root development. The plant shall exhibit proper form for each species and meet all the stem caliper and branching standards as indicated herein. Plants that do not meet all the minimum requirements will be rejected by the government and shall be the responsibility of the contractor to secure acceptable material at no additional cost to the government.

A. Species Form and Top Growth: Tree species shall be delivered with a single, non-headed leader. Shrubs shall be left in natural form and not sheared unless noted. The plants top growth shall be sufficiently large enough for the specified container it is grown in. Undersized and oversized material may be rejected by the Contracting Officer. The plant shall have a main leader with normal caliper and development and growth so that it is not spindly and is able to support itself in an upright position. The plant shall be in healthy condition without signs of stress, disease, pest or mechanical damage. The following list is the acceptable container plant standard for plants for top growth and container size and species indicated. Plant minimum top growth for all tree, shrub and herbaceous species shall be as follows: tree bands, 6 in./152 mm; super cells, 6 in./152 mm; deepots, 10 in./254 mm; treepots 4's, 12 in./304 mm; treepot 8's, 24 in./609 mm (except for willow, oak and alder species shall have a minimum top growth of 18 in./457 mm)

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2.1.4.2 Collection Proceedures

Plant sources and collection sites shall be located in the vicinity of the project. Material that is unavailable in the vicinity of the project shall be collected within a [30]mile/[48] kilometer radius of the project location. Seed shall be collected from a number of representative material sources to ensure genetic diversity and viability of the material. Seeds

and/or cuttings shall be collected in sufficient quantities to obtain survival of the required amounts at the time of delivery to the government. When obtaining cuttings, ensure that "over-cutting does not occur in an area. Cuttings shall be [1/2 in.-1 1/2 in.]/[13 mm-38 mm] in diameter or as otherwise specified and shall be taken from healthy stock material. Cuttings shall not be obtained from an area where permanent damage to the area or existing vegetation would occur. The Contractor shall obtain permission from landowners and obtain all necessary permits prior to collection of cuttings.

2.1.4.3 Container Size

All plants shall be delivered in containers made of durable plastic construction and designed to create a deep root system, except for biodegradable containers as specified. Containers shall have interior vertical ribs which train roots downward and guard against swirling. The bottom of the containers shall have drainage holes for air-pruning. Plants shall be delivered in containers which they are grown as specified herein. Plant material shall be grown in acceptable native nursery industry containers. Container sizes referenced herein shall be as follows:

A. Plugs: Plugs shall have a capacity of 2 cu. in./33 cu. cm, and be 1.25 sq. in./8 sq. cm X 3 in./8 cm long.

B. Tree Bands: Tree Bands shall have a capacity of 20 cu. in./ 327 cu. cm, and be 2.25 sq. in./15 sq. cm X 5 in./13 cm long (depth).

C. Super Cells: Cells shall have anti-spiral ribs and a bottom drainage hole with 3 or 4 side drainage holes on the tapered end. The cells shall be capable of being individually rearranged in containment trays. Super cells shall have a capacity of 10 cu. in. /164 cu. cm, with a 1.5 in./3.8 cm dia and 8.25 in./21 cm cell depth.

D. Deepots: Deepots shall be D40 size containers and have vertical ribs to train roots downward and a bottom drainage hole with 3 or 4 side drain holes on the tapered end. The cells shall be capable of being individually rearranged in containment trays. D40 Deepots shall have a capacity of 40 cu. in./656 cu. cm, with a 2.5 in.6.4 cm dia. an 10 in./25 cm cell depth.

E. Treepots: Treepots shall have vertical ribs to train roots downward, keeping the roots free of swirling and a bottom drainage hole. Treepot 4 shall have a capacity of 173 cu. in/2835 cu. cm, with a 4 in./10 cm width and 14 in./36 cm depth. Treepot 6 shall have a capacity of 380 cu. in/6228 cu. cm, with a 6 in./15 cm width and 16 in./41 cm depth. Treepot 8 shall have a capacity of 588 cu. in/9637 cu. cm, with a 7.75 in./20 cm width and 18 in./46 cm depth.

2.1.5 Size

Plants shall be furnished in sizes indicated. Plants larger in size than specified may be provided, with approval of the Contracting Officer, at no additional cost to the Government.

2.1.6 Source

Planting material shall be [Contractor][Government] furnished

2.2 TOPSOIL

Topsoil shall be the existing surface soil stripped to the depth indicated and stockpiled on the site in accordance with Section 02300 EARTHWORK. Additional topsoil, if required, beyond that available from stripping operations, shall be delivered. Delivered topsoil shall conform to topsoil requirement specified in Section 02300 EARTHWORK and shall be amended as recommended by soil tests for the plants specified.

2.2.1 Soil Test

A soil test shall be performed for pH, particle size, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of plants specified. Soil test results shall be submitted with as-installed (see 1.2 SUBMITTALS).

2.3 SOIL AMENDMENTS

Soil amendments consist of fertilizer, organic soil amendments and soil conditioner. Soil amendments shall be as specified and as required to meet soil suitability for proper plant growth.

2.3.1 Fertilizer

2.3.1.1 Controlled-Release Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and conforming to CID A-A-1909. Shall consist of nitrogen- phosphorous-potassium ratio: [14] percent nitrogen [14] percent phosphorous, and [14] percent potassium or as recommended by Contractor provided soil test and Contracting Officers approval. Fertilizer may be in granular packet, pellet or tablet form.

2.3.2 Organic soil Amendments

2.3.2.1 Sand

Sand shall be clean and free of toxic materials and at least 95 percent by weight shall pass a 10-mesh sieve, and 10 percent by weight shall pass a 16-mesh sieve.

2.3.2.2 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, or other wood waste material free of stones, sticks, and toxic substances harmful to plants and stabilized with nitrogen and having the following properties:

Particle size	Minimum percent by weight passing
No. 4 mesh screen	95
No. 8 mesh screen	80

Nitrogen Content	Minimum percent based on dry weight
Redwood Sawdust	0.5
Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.3.3 Soil Conditioner

For single use or in combination to meet project requirements and requirements for topsoil as recommended by soil fertility test.

2.3.3.1 Wetting Agents

As required by soil test recommendations.

2.3.4 Mycorrhizal Fungi Inoculum

Mycorrhizal fungi inoculum shall be composed of multiple-fungus inoculum as required by soil test recommendations.

2.4 MULCH

Mulch shall be free from weeds, mold and other deleterious materials. Where required, mulch shall be of the following:

2.4.1 Geotextile

2.4.1.1 Woven Polypropylene

Woven polypropylene shall be bi-directional, weigh a minimum of 4 ounces per sq. yard/136 grams per sq. meter, be a minimum of 10 mils/0.25 mm and come in 6 ft./1.83 mwide rolls.

2.4.1.2 Nonwoven Polypropylene
Woven polypropylene shall be bi-directional, weigh a minimum 4 ounces per sq. yard/136 grams per sq. meter, be a minimum 10 mils/0.25 mm thick and come in 6 ft./1.83 m wide rolls.

2.4.1.3 Nonwoven Polyester
Nonwoven polyester shall be spunbonded, water permeable, non-brittle, weigh a minimum 4 ounces per sq. yard/136 grams per sq. meter, be a minimum 10 mils/0.25 mm thick and come in 6 ft./1.83 mwide rolls.

2.4.1.4 Fiberglass Mat

Fiberglass mate shall be of lime borosilicate glass fibers with an average fiber diameter of 8 to 12 microns and 2 in. to 4 in./50 mm to 101 mm strands of fiber bonded with phenol formaldehyde resin. The mat shall be of 100 percent textile glass fiber. Mat shall be roll type, water permeable, and a minimum of 1/4 in./6 mm and a maximum of 1/2 in./12 mm thick with a density of no less than 3/4 lbs per cu. foot/12 Kg per cu. meter

2.4.1.5 Polyethylene

Polyethylene mat shall be water permeable, with a porosity of heat-molded micro-funnels being 400 per sq. inch/62 per sq. cm, non-brittle, weigh a minimum of .11 pounds/5 kilograms, be a minimum of 2.5 mils/.06 mm thick and be UV stabilized with carbon black for a three year life.

2.4.2 Organic Mulch Material

Organic mulch shall be either nitrogenized shredded bark or bark chips ranging in size from 3/4 in. to 1-1/2 in./19 mm to 38mm.

2.4.3 Inorganic Mulch Material

If required, inorganic mulch material shall be material such as decomposed granite, gravel or rock used in such a manner as to provide surface cover, access or help moderate soil moisture loss.

2.5 WATER

Water shall not contain elements toxic to plant life. Unless otherwise directed, water shall be the responsibility of the Contractor.

2.5.1 Screens on Irrigation Intakes

When drawing water from the river, slough, canal or pond, the intake shall be screened to prevent fish from entering the irrigation system. Additionally, the approach velocities around the intake shall be limited.

2.5.1.1 Approach Velocity

a. The approach velocity shall not exceed 0.33 feet per second/0.1 meters per sec.

b. The approach velocity shall be uniformly distributed across the face of the screen.

c. Fish screens shall be cleaned as frequently as necessary to prevent impedance of flow and violation of the approach velocity criteria.

2.5.1.2 Screen Openings

a. Round openings in screening shall not exceed 3/32 in./2.38 mm.

b. Square openings in screening shall not exceed 3/32 in./2.38 mm measured diagonally.

c. Slotted openings in screening shall not exceed 5/64 in./1.75 mm.

d. Orientation of the long axis of the slot or rectangle openings shall be vertical when installed in flowing water.

2.5.1.3 Screen Construction

a. Screens shall be constructed of any rigid material, perforated. or woven, that provides water passage while physically excluding fish.

b. Corrosion resistant screening material is recommended for the screening material to reduce opening clogging due to corrosion blocking.

2.5.1.4 Supplemental Criteria

Supplemental criteria may be issued by the department of Fish and Game (DFG) in the future to accommodate new fish screening technology which may be developed or to modify these "screening criteria" if new scientific data warrants revision.

2.5.1.5 Written Variances

Written Variances to these screening criteria may be granted with the approval of the DFG Regional Manager and concurrence of the Environmental Services Division and Inland Fisheries chiefs and the Corps of Engineers Contracting Officer.

2.6 ANTIDESICCANT

Antidesiccant shall be an emulsion that will provide a film over plant surfaces permeable enough to permit transpiration, and shall not damage the plant.

2.7 PESTICIDE AND HERBICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide, and miticide. Pesticide material shall be labeled for use and applied only as registered by EPA and approved [herbicide] [insecticide] [fungicide] [nematocide] [rodenticide] [miticide].

2.8 INFRASTRUCTURE

2.8.1 Signs

Signs shall be as per detail, graphics and approved by the Contracting officer prior to manufacture.

2.8.2 Fences

Fences shall be of the material, size, and construction as identified in the drawings and details.

2.8.2.1 Protective Fencing

Fencing used for the temporary protection of existing vegetation and infrastructure during construction, and for overall safety shall be knited polyethylene with double selvedge edges, 46-72 inches/1.2-1.8 meters in height and orange color.

2.8.2.2 Barbed Wire

Barbed wire shall be 12.5 gauge steel wire with 4 point barbs. Wire spacing shall be as indicated on drawing.

2.8.2.3 Tee Posts

Tee post and braces shall be .95 weight minimum steel. Each post shall be 6 ft./1.82 m in length and shall have two flanges welded along side the buried portion of the post and shall have ribs continuously along the entire length of the post.

2.8.2.4 H-Brace Assemblies

H-Brace assemblies shall consist of pressure treated 6 in./152 mm diameter X 8 feet/2.4 meter length douglas fir post. Top of post shall be beveled to a 30 degree angle, see drawings. Horizontal braces shall be of similar material. Diagonal bracing shall be of 12.5 gauge high tensile fence wire, secure to post as shown on drawings. Tighten wire with a stick. Spacing for H-Brace assemblies shall be as indicated on drawings.

2.8.3 Gates

Gates shall be of the material, size, and construction as identified in the drawings and details.

2.8.3.1 Steel Pipe Gate

Horizontal members of steel pipe gate shall be of 2 in./50 mm diameter galvanized steel pipe. Vertical hinged member of gate shall be of 4 in./ 101 mm diameter x 7.5 feet/2.3 meter galvanized steel pipe. A 3/16 in./4.7 mm wire rope cable with turnbuckle shall provide support for gate swing as shown on drawings.

2.8.4 Access Roads

Access roads shall be of the material, size, and construction as identified in the drawings and details.

2.9 PLANT PROTECTION

All [woody container stock][live cuttings][woody container stock and live cuttings] shall receive plant protection and shall be selected from the following:

2.9.1 Extruded Tube

Extruded tube shall be of a round profile of between 3 in. to 5 in./76 mm to 127 mm diameter and 24 in./609 mm in length. Extended tubes shall be between 3 in. to 5 in./76 mm to 127 mm diameter and 36 in./914 mm in length. It shall be of seamless extruded tube made of twin wall polypropylene. The shelter shall be non-porous and sufficiently rigid to maintain its shape and diameter, and allow the shelter to be vertically tapped down into the soils far enough to seal the bottom. Its UV stabilization shall be sufficient to remain intact for 5 years. The inside top shall be flared to limit injury to bark and shoots. It shall be translucent and for full sun applications allow no less than 25% light transmittance. The shelter shall be rigid enough to allow a stake ½ foot to 1 foot/152 mm to 304 mm less than the length of the tube, to be secured to it.

2.9.2 Browse Guard

Browse guard shall have a diameter of between 3 in.to 6 in./76 mm to 152 mm and a minimum of 10 1/2 in/266 mm length. It may be constructed of polyester film, wax coated paper, wire or other material which is consistent with protecting the plant from herbevour browse. It shall remain intact for 3 years.

2.9.3 Aluminum Screen

Aluminum Screen shall be of standard window screen material, or an approved equal. The screen shall extent 6 in./152 mm below finished grade.

2.9.4 Beaver Barrier Cages

Beaver barrier cages shall be of the following:

2.9.4.1 Welded Wire Fence

Welded wire fencing shall be 14 gauge galvanized steel and constructed of a minimum of 47 in./1.2 m high welded wire material. Welded wire openings shall be no greater than 16 square inches/406 square millimeters and no less than 8 square inches/203 square millimeters.

2.9.4.2 Tee Post

Tee posts shall be .95 weight minimum steel. Each post shall be 6 ft./1.8 m in length and shall have two flanges welded along side the buried portion of the post and shall have ribs continuously along the entire length of the post.

2.9.4.3 Fasteners

Fasteners shall be non-corrosive wire and capable of lasting the life of the wire fencing.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Verify Site Conditions

The Contractor shall verify the site conditions prior to start of work and note inconsistencies on drawings. The Contractor shall notify the Contracting Officer in writing, prior to commencing work, all conditions which are determined to cause negative impacts to the success of the work.

3.1.2 Underground Obstructions to Plants

The location of underground utilities and facilities shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense. It is the responsibility of the Contractor to call all appropriate utility services, including USA Alert to determine potential underground lines.

3.1.3 Soil Testing

Existing site topsoil, delivered topsoil, excavated plant pit soil, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection on site shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the plant material specified.

3.1.4 Documentation of Existing Vegetation

Prior to any construction activities, the Contractor shall document the existing vegetation in the representative locations specified herein and on drawings. Documentation and methodology shall consist of the following:

3.1.4.1 "Sample area" Identification

The contractor shall select [describe number of sample sites and size of sample sites] located [describe how sample areas are to be located]. This area shall hereafter be referred to as the "Sampling area". Vegetation type shall be determined for [describe how and what sample areas will be determined for vegetation type]

3.1.4.2 Representative of Site

The "Sampling Area" shall be an area representative of the site. the contractor shall stake the boundaries of the area and receive Contracting Officers approval prior to commencing work. The Contracting Officer may require the Contractor to restake the area at another location at no additional cost to the Government.

3.1.4.3 Methodology

The methodology and sampling may be rough and does not need actual plant counts for grasses and herbaceous vegetation including woody vines. Within each [describe how and what sample areas will be determined for vegetation type]estimate the approximate percent cover for each species present. All terrestrial woody species (except woody vines) shall be individually counted and identified. Identify all species present by both botanical and common names.

3.1.4.4 Date, Time and environmental Documentation

The date, time, river flows and weather conditions on the day of surveys shall be noted.

3.1.4.5 Drawings and Profiles

The Contractor shall provide scaled drawings which show horizontal and vertical location in plan and profile for each "Sample Area". One representative composite cross section shall be provided for each site that presents the generic elevation and type of vegetation found, location of any deposition over the rock, and the water surface elevation at the time of the survey

3.1.4.6 Photographic Documentation

Prior to and after plant installation, the Contractor shall take photographs (35mm, color with a 50mm lens or similar) and provide prints to the Contracting officer which document the site from multiple angles and views. photographic documentation shall include fixed station points that cover the entire construction site.

3.2 SITE PREPARATION

3.2.1 Soil Preparation

Soil preparation shall include all soil work necessary to install plants as required herein.

3.2.1.1 Herbicide Application

If required, herbicide shall be sprayed over the entire site prior to planting. Coordinate time of spraying and planting so that the herbicide does not negatively impact the plant material.

3.2.1.2 Mowing

Mow the entire site prior to planting. Site shall be kept mowed to within six inches of the ground surface for the duration of the installation period.

3.2.1.3 Discing

All areas designated for planting shall be disced to a [4 in./101 mm][6 in./ 152 mm][12 in./304 mm]depth prior to seeding. Areas where accessibility and grades prohibit discing work shall be identified to the Contracting Officer for concurrence.

3.2.1.4 Grass Seeding

All site preparation shall be coordinated with designated cover crop seeding.

3.2.2 Layout

3.2.2.1 Survey

Project site shall be surveyed and staked prior to seeding.

3.2.2.2 Demarcation of Project Site

The project site shall be marked with flags showing the project limits.

3.2.2.3 Irrigation Layout

Layout of irrigation shall take place prior to planting operations. All above and below ground piping and equipment shall be coordinated with all other project requirements, including water source, access roads and plant locations.

3.2.2.4 Plant Layout

A. Flagging Plant Material: Plant locations and/or zones are designated on the attached drawings. All plant locations and/or zones shall be marked on the ground with colored surveyor flags (a different color and/or designation for each species). If site conditions are prohibitive, it shall not be required to stake locations of emergent aquatics. Plant material locations shall be adjusted by the Contractor if so directed by the Contracting Officer to meet field conditions. All flagging shall be left in the ground for the duration of the installation period or as

directed by the contracting officer.

B. Terrace Areas: Terraced areas include berms, level rock revetment and planting areas other than rock revetment slopes. The required number of plants within a designated area shall be spaced evenly and shall be approved by the Contracting Officer prior to installation. The planting configuration or pattern determined shall be coordinated with the irrigation system and equipment necessary to manage weed growth. Plant layout shall utilize the plants specified in the plans for each site.

3.2.2.5 Infrastructure Layout

All infrastructure shall be located and coordinated with all project requirements.

3.2.3 Protection of Existing Vegetation

Locations seeded with grass or existing grass areas designated for protection shall not be disturbed in a manner which will cause grass mortality. Existing trees, shrubbery, and beds that are designated to be preserved shall be barricaded in a manner that will effectively protect them during planting operations.

3.3 EXCAVATION

3.3.1 Obstructions Below Ground or Poor Drainage

When obstructions below ground or poor drainage affect the contract operation, proposed adjustments to plant location, type of plant and planting method or drainage correction shall be submitted to and approved by the Contracting Officer.

3.3.2 Live Cutting Planting Pit

Pit excavation for live cuttings shall be as follows:

3.3.2.1 Unreveted Sites

Planting pits for all sites, without surface rock revetment, shall be as follows:

A. Pre-formed Planting Pit: The planting pit for all live cuttings shall be pre-formed dug or drilled to produce vertical sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The size of the planting pits shall be as shown on the drawings and shall have a size as indicated on the drawings.

B. Maintain Soil Contact with live Cutting: The pit shall be of sufficient size as to accept the cutting without damage to plant material and shall be backfilled in a manner which will maintain continuous soil contact for its entire subsurface length.

C. Ensure No Erosion: The method of creating the pit shall not cause soil erosion

3.3.2.2 Reveted Sites

Planting pit excavation for live cutting material may be by hand or mechanical power, as determined by the Contractor. The method shall be coordinated with the availability of the cutting material, as well as, the size of material required. The plant material shall be of sufficient strength to withstand the equipment used to insert it into the substrate without damage to the material. It is the Contractor's responsibility to determine if access to the top of the rock revetment and berm is sufficient for tractor driven and 4-wheel drive vehicles. The method shall conform to the following criteria:

A. Pre-formed Planting Pit: The planting pit for all live cuttings shall be pre-formed (dug, punched, drilled, etc.) and large enough to allow the stock to be inserted without breakage or damage to the stock.

B. Maintain Soil Contact with Pole Cutting: The pit shall be of sufficient size as to accept the cutting without damage to plant material and shall be backfilled in a manner which will maintain contact in areas beneath revetment.

C. Ensure No Erosion or Rock Displacement: The method of creating the pit shall not permanently displace the adjacent rock revetment or cause soil erosion in the vicinity of the pit.

3.3.3 Container Grown Planting Pit

Pit excavation for container grown plant material shall be as follows:

3.3.3.1 Unreveted Sites

A. Pre-formed Planting Pit: The planting pit for all container material shall be pre-formed (dug or drilled) and shall have a size as indicated on the drawings. Plant pits shall be dug to produce vertical sides and uncompacted bottoms. Remove only enough soil within the pits so that the rootball can be freely placed without restriction.

B. Maintain Soil Contact: The pit shall be of sufficient size as to accept the container material without damage to plant material. The plant material shall maintain continuous soil contact for the entire root ball.

C. Ensure No Erosion: The method of creating the pit shall not cause soil erosion.

3.3.3.2 Reveted Sites

A. Pre-formed Planting Pit: The planting pit for all container material shall be pre-formed (dug or drilled) and shall have a size as indicated on the drawings. Plant pits shall be dug to produce vertical sides and uncompacted bottoms. Remove only enough soil within the pits so that the rootball can be freely placed without restriction.

B. Maintain Soil Contact: The pit shall be of sufficient size as to accept the container material without damage to plant material and shall be backfilled in a manner which will maintain

contact in areas beneath revetment.

C. Ensure No Erosion or Rock Displacement: The method of creating the pit shall not permanently displace the adjacent rock revetment or cause soil erosion in the vicinity of the pit.

3.3.4 Direct Seed Planting Pit

A. Pre-formed Planting Pit: The planting pit for direct seed material shall be pre-formed (dug or drilled) and shall have a size as indicated on the drawings. Plant pits shall be dug to produce vertical sides and uncompacted bottoms.

B. Maintain Soil Contact: The pit shall be of sufficient size as to accept the seed without damage to plant material. The plant material shall maintain continuous soil contact for the entire seed. Work soil to a friable condition within the planting pit.

C. Ensure No Erosion: The method of creating the pit shall not cause soil erosion.

3.3.5 Transplant Pit

Transplant pits shall be hand dug and/or dug with a mechanical spade or backhoe type equipment. The depth shall be able to accommodate the transplants rootball where the root crown is flush with the finish grade.

3.4 PLANT INSTALLATION

3.4.1 Container Grown Plants

3.4.1.1 Unreveted Sites

A. [Woody Container Material][Herbaceous Container Material][Woody and Herbaceous Container Material]: Containers shall be removed without damage to the plant or root system. Place plant as indicated in drawings. Container stock shall be backfilled, carefully worked around the rootball, tamped, and watered immediately. Plants shall be set in relation to surrounding grade so that the root crown is slightly above the surrounding soil or as indicated on the drawings.

B. Biodegradable Container Material: Plants shall be installed by placing the container in a pre-formed hole so that its original growing grade is even with the surrounding new grade. Compact the soil surrounding the container to prevent movement.

3.4.1.2 Reveted Sites

A. [Woody Container Material][Herbaceous Container Material][Woody and Herbaceous Container Material]: Containers shall be removed without damage to the plant or root system. Place plant as indicated in drawings. Container stock shall be backfilled, carefully worked around the rootball, tamped, and watered immediately. Plants shall be set in relation to surrounding grade so that the root crown is slightly above the surrounding soil or as indicated on the drawings. Water basins, mulch or plant protection material are not required for plants installed where rock revetment is at the surface. Where there is

an overburden of soil above the rock revetment, water basins shall be formed. Replace all displaced rock around the container stock. Leave site consistent with conditions existing prior to plant installation.

B. Biodegradable Container Material: Plants shall be installed by placing them in the vertical position within the stone revetment. Ensure the container is stable, properly wedged and the circumference is surrounded with stone. Propagules shall remain free of obstructions or other conditions, pertaining to the stone, which may inhibit growth.

3.4.2 Live Cuttings

3.4.2.1 Unreveted Sites

Live cutting plants shall be installed by placing the cutting in a vertical position into the planting pit. Ensure the natural terminal end of cuttings is placed likewise with buds oriented in the upward direction. Cuttings split during installation shall be removed from site and replaced. Live cuttings shall be backfilled, carefully worked around the cutting, tamped, and watered immediately. Ensure soil contact is maintained along the entire length of the cutting placed below grade. Four-fifths of the installed cutting shall extend above the immediate soil surface or as indicated on drawings.

3.4.2.2 Reveted Sites

Live cutting plants shall be installed by placing the cutting in a vertical position into the planting pit or by tamping the cutting into the ground utilizing hand work or mechanical methods. Ensure the natural terminal end of cuttings is placed likewise with buds oriented in the upward direction. Cuttings split during installation shall be removed form site and replaced. Live cuttings utilizing a planting pit shall be backfilled, carefully worked in and around the cutting, tamped, and watered immediately. Ensure soil contact is maintained along the entire length of the cutting placed below grade. Four-fifths of the installed cutting shall extend above the immediate soil or stone surface, or as indicated on drawings. Replace all displaced rock around the stock and leave in a condition consistent with what was there, prior to installation. Water basins, mulch or plant protection material are not required for plants installed where rock revetment is at the surface. Where there is an overburden of soil above the rock revetment, water basins shall be formed.

3.4.3 Direct Seed Material

Depth of seed placement in soil shall be twice the diameter of the seed. Seed shall be installed by placing the seed in the planting pit as indicated on the drawings. Direct seed material shall be backfilled, carefully worked around the seed, tamped, and watered immediately.

3.4.4 Direct Transplants

Aquatic plugs shall be installed by placing the material in a spade or plug hole so that its original growing grade is even with the surrounding new grade. Press the soil surrounding the plug into contact with it so that no voids remain.

3.4.5 Transplanting Installation Procedures

3.4.5.1 Pruning

Cut plant back to 3 to 6 feet/.9 to 1.8 meters from the ground or to 50 percent of it's height (whichever is greater) by removing branches and stems above this height. All branches and stems removed shall be immediately transported (within the same 12 hour period) to the transplanting site as indicated in these specifications. Keep removed branches and stems covered with wetted burlap sacks during transport.

3.4.5.2 Removal and Planting

Remove the plant using a hand dug method, mechanical spade or backhoe type equipment, taking as much of the root ball as possible, without any further damage to the stock. Transport the stock immediately and keep moist at all times. Replant immediately at the revegetation site as indicated on the drawings in the pre-dug excavation hole. Immediately place removed branches and stems around the base of the plant.

3.4.5.3 Replacing excavated Soil Plug

Replace the excavated hole with similar soil material as that was removed and compact to the degree it was prior to removal.

3.4.5.4 Elderberry Transplants

As a reference, the Contractor shall refer to the U.S. Fish and Wildlife Service guidelines, General Compensation Guidelines for the Valley Elderberry Longhorn Beetle, dated July 14, 1988 or later version if available. If conflicts arise, the requirements indicated in this specification shall govern.

3.4.6 Plant Protection

Provide plant protection devices as specified in paragraph 2.9 PLANT PROTECTION, and as follows:

3.4.6.1 Browse Guards, Extruded Tube and Aluminum Screen

Place guard, tube or screen around plant material so that the plant material is centered. Firmly compact soil around base of guard, tube or screen so that it is secure and sturdy. Height and depth of device shall be as shown on the drawings.

3.4.6.2 Beaver Barrier Cages

Place cage around plant material so that the plant material is centered and does not come in contact with it. Height and depth of device shall be as shown in the details

A. Installing Tee Posts: Posts shall be set plumb. Drive posts into the ground and firmly compact soil around base. Height of post shall be no greater than 50 in./1.2 m above grade. Tee post ribs shall be facing away from plant. Space tee posts on opposite side of plant and 3 ft./914 mm apart. Divide spacing equally on both sides of plant.

B. Installing Wire Fencing: Position wire to encircle plant and

tee posts. Overlap ends a minimum 3 inches and attach to each other with fasteners. Wire shall be set directly on grade with no gaps greater than ½ in./12 mm along ground surface. Wire shall be tight against tee posts. Wire shall secured against tee posts with fasteners.

C. Installing Fasteners: Place a minimum of 3 fasteners when securing the overlapped wire ends. Place one within 3 in./76 mm of the top and bottom and one spaced equally in the middle. Use two fasteners per tee post when fastening wire.

3.4.7 Fertilizer

3.4.8.1 Controlled-Released Fertilizer

Controlled-release fertilizer shall be placed in packet, pellet or tablet form in the plant pit in the immediate vicinity of the feeding roots in accordance with the manufacturer's recommendations. Fertilizer shall not make direct contact with feeding roots. Quantity of fertilizer shall be equal to .7 ounces/21 grams per plant pit.

3.4.8 Backfill Soil Mixture

Backfill shall be incorporated as part of the installation operations. The bed shall be brought to a condition which is consistent and blended with the surrounding existing areas. The backfill soil mixture shall be a sandy loam mixture and may be from the existing soil. The mixture shall be thoroughly mixed. If an organic soil amendment is used, the amendment shall be of a decomposed wood derivative nature with ratios as follows:

Topsoil	1 part to mixture
Organic Soil Amendment	2 parts to mixture

3.4.9 Soil Conditioners

3.4.9.1 Wetting Agents

[Place Wetting Agent Execution information]

3.4.9.2 Inoculants

Mix product with back fill in the top 8-10 inches/203 mm-254mm of planting hole adjacent to the root ball for larger plants, and 4-6 inches/101 mm-152 mm for smaller plants, making sure that it is in contact with the root ball. Each 8 ounce/226 gram. bag will treat a 2 in./50 mm caliper tree.

3.4.10 Replace Rock Revetment

After backfilling, where working in revetment, replace revetment to its original condition. Rock shall be placed tightly around plant material, so that the original surface protection is uncompromised.

3.4.11 Water Basins

Water basins shall be constructed around all plants, as stated herein and indicated on drawings, with the exception of aquatic plants and/or plants installed on reveted sites, unless otherwise noted on drawings.

3.4.11.1 Direct Seed, Live Cutting and Container Plants

A 36 in./914 mm diameter 4 in./101 mm high earth water basin made of topsoil shall be formed around all individual plants. The basin shall be level and compacted to hold its shape for the duration of the Establishment Period. The basin shall be capable of containing the irrigation water applied within its perimeter.

3.4.11.2 Transplants

Construct a circular water retention basin from the excavated soil about 8-10 feet./2.4-3 meter in diameter and 8 in./203 mm high with the transplant in the center

3.4.12 Mulching

Place mulch over water basins as indicated on drawings.

3.4.13 Plant Tags

All container plantings shall be permanently tag with aluminum tags displaying species name prior to installation acceptance.

3.5 INFRASTRUCTURE INSTALLATION

Infrastructure material and equipment shall be installed where required as specified in drawings and described herein.

3.5.1 Signs

Signs shall be installed where shown on the drawings or as directed by the Contracting Officer. Set post and sign as indicated on drawings and details.

3.5.2 Fences

Install fences as indicated below and as shown on drawings and details.

3.5.2.1 Fence Layout

Fence shall be laid out in the configuration as shown on the drawings.

3.5.2.2 Installing Post and Brace Assemblies

Set post plumb, except where indicated for lean, and compact soil to 95% around base of post. Brace assemblies shall be constructed and braced so that final setting is firm and able to support tension of wire, without deflection of post or brace assemblies. Construct as per drawings.

3.5.2.3 Attaching and Tightening Wire

Attach barbed-wire as per drawings and details. Space wires as indicated in drawings. Wire shall be set taunt and in tension so that no sag occurs. After tightening, excess wire shall be cut and removed from fence.

3.5.2.4 Protective Fencing

Install Tee-post or equal a maximum of 10' apart and attach fencing. Vegetation within the project site which might be damaged during demolition

and/or construction, and which are indicated to be left in place, shall be protected. When protecting trees and shrubs place fencing outside the perimeter of branches.

3.5.3 Gates

Gates shall be installed where indicated on drawings. Supply all hardware to make gate completely operable and align with adjoining fence, where appropriate. Ensure gate hinge post is set plumb so that it maintains a level travel path for the full swing range. Grade soil on full range of gate swing so that it is unimpeded by soil, rock or other impediments.

3.5.4 Access Roads

Access Roads shall be installed where indicated on drawings and details. Road construction shall not alter or interrupt existing drainage conditions

3.6 MAINTENANCE DURING INSTALLATION PERIOD

3.6.1 General Maintenance

Installed plants shall be maintained in a healthy growing condition. Maintenance shall begin immediately after each plant is installed and continue throughout the Installation Period. The maintenance includes watering, weeding, straightening, adjusting, repairing and other necessary operations to ensure each plant is maintained in a healthy growing condition. The area immediately around the plant 18 in./457 mm radius shall be kept free of weeds, grass and other undesired vegetation. Plants shall be checked for settlement and shall be reset to proper grade as necessary. Run-off, puddling and wilting shall be prevented and corrected as necessary. Grasses and weeds shall be kept below 3 in./76 mm in height

3.6.2 Watering

3.6.2.1 Watering Method

The method of watering the plants shall be determined by the Contractor. The Contractor shall not apply water at a rate where eroding occurs, and shall determine operation length of time and precipitation rate at which water is applied so as to achieve the rate of application required without causing erosion. The contractor shall ensure the system will remain intact and functioning, given site tidal influences, flooding and other high water events. Method shall be able to deliver the water at the rate, frequency and duration specified herein and be capable of delivering the required amount as specified in Section 02957 REVEGETATION ESTABLISHMENT.

3.6.2.2 Operation of System

The Contractor shall consider in his/her design the fluctuations of the river and/or tides in operating and maintaining the system. The Contractor is responsible for its operation, damage and repair for the duration of the Installation and Establishment periods.

3.6.2.3 Application Frequency and Rate

Water shall be provided for the duration of the Installation Period and shall be as follows

3.6.2.3.1 Watering-In

The plants shall be watered immediately (within 12 hours) upon installation.

3.6.2.3.2 Frequency

The system shall provide for watering of the plants immediately after planting and continuously at a frequency of once a week during the period 1 April through 1 November until an "Installation Acceptance" is given in writing by the Government. During the Establishment Period, requirements specified in section 02957 REVEGETATION ESTABLISHMENT shall apply.

3.6.2.3.3 Rate of Application

During the Installation Period, each plant shall receive 5 gallons/19 liters of water at each watering. The application shall be applied at a rate where excessive runoff does not occur. The watering system shall apply water so that it is available to the plants root system. During the Establishment Period, requirements specified in 02957 REVEGETATION ESTABLISHMENT shall apply.

3.6.3 Application of Pesticides and Herbicides

When pesticide and/or Herbicides becomes necessary to remove disease, weeds or pest, a state-certified applicator shall apply required pesticide and/or Herbicide in accordance with State EPA label restrictions and recommendations. Hydraulic equipment shall be provided for the liquid application of pesticides with a leak-proof tank, positive agitation methods, controlled application pressure and metering gauges. A pesticide treatment plan shall be provided to the Contracting Officer as specified in paragraph 1.3 SUBMITTALS.

3.7 RESTORATION AND CLEANUP

3.7.1 Restoration

Access roads, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense

3.7.2 Cleanup

Excess and waste material from the planting operation shall be removed and disposed of off the site according to all federal, state and local codes. Adjacent paved areas shall be cleared.